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First Named Inventor

Hong et al.

Art Unit

2834

Examiner Name

Yahveh Comas

Attorney Docket Number

1229.006

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Hong, et. al.

Application No.: 10/695,253

Filed: October 27, 2003

For: COMPOSITE STATOR AND BASE FOR A
LOW PROFILE SPINDLE MOTOR

Examiner: Yahveh Comas

Art Group: 2834

APPEAL BRIEF

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To the Board of Patent Appeals and Interferences:

This Appeal is from the decision of the Examiner mailed on July 27, 2005 where the Office Action was made final, rejecting claims 1, 3-4, 6-9, 11, 12, 14-17 and 19-22. Pursuant to 37 C.F.R. §41.31, Appellants respectfully request consideration of this Appeal Brief by the Board of Patent Appeals and Interferences.

REAL PARTY IN INTEREST

Seagate Technology LLC is the Assignee of the present patent application. The respective assignment is recorded with the USPTO on reel/frame 014647/0321.

RELATED APPEALS AND INTERFERENCES

Appellant is aware of no related Appeals or Interferences that will affect or be directly affected by or have a bearing on the Board's decision in the present Appeal.

STATUS OF CLAIMS

Claims 1, 3-4, 6-9, 11-12, 14-17 and 19-22 were rejected by the Office Action mailed on July 27, 2005, and are pending. Appellant is appealing the final rejection of all pending claims.

STATUS OF AMENDMENTS

There are presently no outstanding amendments with respect to the pending claims 1, 3-4, 6-9, 11-12, 14-17 and 19-22 or the application in entirety.

SUMMARY OF CLAIMED SUBJECT MATTER

The demands on disc drive memory systems have intensified because of new environments for usage, miniaturization and increased performance needs. It has become essential in the industry to design disc drives having reduced dimensions.

Appellant's claimed invention reduces the axial height of a low profile spindle motor. The base plate axial thickness is minimized but motor stiffness is maintained or improved by forming a composite component of the base plate, stator and motor seal. An axial height reduction of 0.4 mm is provided in an embodiment, which equates to a savings of about 12 % of the total space in a 3.3 mm thickness low profile disc drive design. This significant space savings provides a valuable range of possibilities to disc drive performance. Other additional performance demands

of the industry are maintained including reduced vibration and reduced acoustic noise (Summary, pg. 1, par. 8 and 9).

Independent claim 1 claims a novel spindle motor. A rotatable component and a stationary component define a bearing gap and are relatively rotatable (pg. 3, par. 25, lines 5-8). A stator and a base plate are affixed to the stationary component (pg. 2, par. 25, lines 62-63). A bonding substance substantially fills a separation between the stator and base plate, and unites the base plate, a motor seal and the stator (pg. 4, par. 45; lines 40-42; and Fig. 4A). The base plate axial thickness is minimized adjacent to the separation (pg. 3, par. 35, lines 48-52; and Fig. 4B).

To further provide axial space reduction, a portion of the stator is repositioned below a surface of the base plate, as dependently claimed (pg. 4, par. 46; and Fig. 4C, Fig. 4E, Fig. 5B).

Independent claim 9 includes the limitations of claim 1 and further defines the spindle motor for incorporation into a disc drive storage system (pg. 2, par. 24; and Fig. 1, Fig. 4B).

Independent claim 17 claims a method that includes forming a bonding substance substantially about a stator and substantially filling a separation defined between the stator and a base plate with the bonding substance. The method also includes uniting the base plate, a motor seal and the stator, and minimizing the base plate axial thickness adjacent to the separation (pg. 2, par. 23, lines 7-9).

GROUND OF REJECTION TO BE REVIEWED ON APPEAL

The grounds of rejection to be reviewed on appeal are as follows:

Whether claims 1, 3-4, 6-9, 11-12, 14-17 and 19-22 are unpatentable under 35 U.S.C. §103(a) over Dunfield (U.S. Patent 5,694,268) in view of Fujii (U.S. Patent 5,426,548), and in further view of Papst (U.S. Patent 5,877,916).

Appellants note that Dunfield and the present invention have a common Assignee (Seagate Technology).

GROUPING OF CLAIMS

Appellant requests that all claims be grouped separately as follows:

Group I = Claim 1	Group X = Claim 14
Group II = Claim 3	Group XI = Claim 15
Group III = Claim 4	Group XII = Claim 16
Group IV = Claim 6	Group XIII = Claim 17
Group V = Claim 7	Group XIV = Claim 19
Group VI = Claim 8	Group XV = Claim 20
Group VII = Claim 9	Group XVI = Claim 21
Group VIII = Claim 11	Group XVII = Claim 22
Group IX = Claim 12	

ARGUMENT

I. Appellants Claimed Invention is Not Obvious in view of the Cited References

Obviousness under 35 U.S.C. §103(a) is not established against Appellants claimed invention. Features of Appellants claimed invention are not taught or suggested by the references either individually or combined. Further, there is no suggestion or motivation either in the references or in knowledge generally available to one of ordinary skill in the art to modify the references or combine the references.

A. Overview of Appellants Claimed Invention

The demands on disc drive memory systems have intensified because of new environments for usage, miniaturization and increased performance needs. It has become essential in the industry to design disc drives having reduced dimensions. Appellant's claimed invention reduces the axial height of a low profile spindle motor. The base plate axial thickness is minimized but motor stiffness is maintained or improved by forming a composite component of the base plate, stator and motor seal. An axial height reduction of 0.4 mm is provided in an embodiment, which equates to a savings of about 12 % of the total space in a 3.3 mm thickness low profile disc drive design. This significant space savings provides a valuable range of possibilities to disc drive

performance. Other additional performance demands of the industry are maintained including reduced vibration and reduced acoustic noise.

B. Appellants Claims in view of the cited references Fujii, Dunfield and Papst

1. Appellants Claim 1

The cited references Fujii, Dunfield and Papst either individually or combined do not teach or suggest Appellants claim 1. The references particularly do not teach or suggest “a bonding substance, formed substantially about the stator, substantially filling the separation and uniting the base plate, a motor seal and the stator, wherein the base plate axial thickness is minimized adjacent to the separation.”

a. Fujii, U.S. Patent 5,426,548

The Office Action cites Fujii for disclosing a minimized base plate axial thickness to minimize the axial thickness of the whole apparatus. Appellants traverse the rejection.

i. Fujii illustrates a recess in a base plate with land portions that provide a surface to support teeth ends, not a minimized base plate

A recess with land portions providing a surface to support teeth ends of a core is not the same as, and does not teach, minimizing the axial thickness of the base plate to reduce axial thickness, as in Appellants claimed invention. There is no teaching or suggestion in Fujii that the recess is formed to axially minimize the base plate, only that there is a recess. In actuality, the Fujii base plate can be axially *enlarged* and yet still provide a recess with land portions.

Fujii's states: “The annular land portion 22 between these annular recesses provides a surface for supporting teeth ends of a core.” (Fujii, col. 2, lines 60-63).

ii. Appellants reduce axial thickness by minimizing the base plate and focuses on a base plate composite component to add stiffness, whereas Fujii having a conventional axially reduced disc drive focuses on a disc clamping assembly

Fujii describes the hard disk connection: "...the hard disk 56 is pressed both at the upper and lower sides... between the disk supporting surface 54 and the clamp member... Further, it is possible to reduce the axial thickness of the apparatus as compared with known apparatus of the type in which the clamp member is fixed to the top of the rotor hub by means of a screw" (Fujii, col. 5, lines 32-43).

iii. Fujii does not form, and teaches away from, a bonded and united composite stator and base plate

Appellants minimize base plate axial thickness, and at the same time maintain or improve motor stiffness by forming a composite component of the stator and base. In contrast, Fujii does not use bonding and separates the stator from the base. Fujii describes a rotor hub placed above and below the stator, separating the stator from the base:

"A rotor hub 218 has a substantially bowl-like form." (Fujii, col. 7, line 67). Also, see item 218, FIG. 3, Fujii. "The lower end of the rotor hub 218 fits in the recess 212 in the base plate 210 leaving a slight gap therebetween" (Fujii, col. 8, lines 8-10).

Further, the positioning of the rotor hub in Fujii has the effect of increasing axial thickness at the base plate, whereas Appellants are minimizing axial thickness.

iv. Fujii teaches away from Appellants motor seal attachment to a stator.

Fujii uses reservoir grooves as a seal (which a stator cannot be attached to): "...the lubricant which passes the gap between the armature 26 and the rotor hub 38 is trapped in the first reservoir groove 46" (Fujii, col. 3, lines 63-65).

b. Dunfield, U.S. Patent 5,694,268

The Office Action cites Dunfield for disclosing a bonding substance formed about a stator. Appellants traverse the obviousness rejection. Appellants note that Dunfield and the present invention have a common Assignee (Seagate Technology).

Dunfield is concerned with damping sympathetic vibrations in a stator structure to reduce the generation of acoustic noise in the storage device. Dunfield describes, at length, various mounting techniques to secure the overmold to the base including an annular projection, a mounting aperture, a mounting pin, a mounting ear, a mounting ring, an O-ring, a C-clamp, etc. Unlike Appellants claimed invention, a bonding substance is not formed to the base plate to minimize the base plate for creating a composite component to form a low profile disc drive. The Examiner also states in the Final Office Action that Dunfield does not teach a motor seal and a base plate axial thickness minimized adjacent to the separation between the stator and base plate.

c. Papst, U.S. Patent 5,877,916

The Office Action cites Papst for disclosing a motor seal. Appellants traverse the rejection.

i. Papst does not teach or suggest forming a stator to a motor seal

Although Papst describes a ring 144 to retard contaminants, Papst fails to teach or suggest forming the stator to the ring. The Examiner merely included a reference having a contaminant seal and concluded that Appellants claimed element of having a motor seal formed to a stator via a bonding substance was obvious. This is not so. An invention that is a combination of known elements (a motor seal) will be nonobvious if the known elements typically deal with different problems. Lindermann Maschinenfabrik GmbH v. American Hoist & Derrick Col., 730 F.2d 1452, 221 USPQ 481 (Fed. Cir. 1984). As applied to the present matter, the ring in Papst deals with retarding contaminants, not with forming the stator to the motor seal for a composite component.

ii. Papst increases axial thickness

Papst also teaches away from Appellants claimed invention.

In contrast to Appellants axially minimized motor, Papst increases axial thickness. An object of Papst is to provide a disk storage device that achieves enhanced air gap seal. (see Papst, Background, col. 1, lines 46-48). To achieve that objective, Papst teaches a wider axial spacing between bearings 16 and 18: “The bearing tube supports the bearings in which the spindle shaft is

journalled and allows wider axial spacing between the bearings [16 and 18]...” (Papst, Summary, col. 1, lines 62-64).

Further, Papst extends bearing tube 114 (in an axial extended direction) to form a seal: “...mates with the extended upper end of the bearing tube 114 to form a labyrinth seal 156...” (Papst, col. 5, lines 32-33).

In contrast to Appellants minimized base plate, if the base plate in Papst were minimized, then the bearing tube 114 in Papst would be axially minimized thereby forming a narrower axial spacing between the Papst bearings, rendering Papst unsatisfactory for its intended purpose.

2. Appellants Claim 3

It is submitted that dependent claim 3 is allowable for at least the reasons stated with regard to its independent claim 1. Further, dependent claim 3 recites further features and combinations of features that are patentably distinct and not taught or suggested by Fujii, Papst and Dunfield either individually or combined.

The references particularly do not teach or suggest a bonding substance comprising a thermally conductive epoxy having a high bonding strength. Regarding claim 3, the Examiner states that the references do not disclose the claimed invention but it is obvious to one having ordinary skill in the art... The Examiner provides no concrete evidence or evidentiary support for this finding.

3. Appellants Claim 4

It is submitted that dependent claim 4 is allowable for at least the reasons stated with regard to its independent claim 1. Further, dependent claim 4 recites further features and combinations of features that are patentably distinct and not taught or suggested by Fujii, Papst and Dunfield either individually or combined.

The references particularly do not teach or suggest a thermally conductive epoxy comprising one of TC-2707 and DP-190.” Regarding claim 4, the Examiner states that the references do not

disclose the claimed invention but it is obvious to one having ordinary skill in the art... The Examiner provides no concrete evidence or evidentiary support for this finding.

4. Appellants Claim 6

It is submitted that dependent claim 6 is allowable for at least the reasons stated with regard to its independent claim 1. Further, dependent claim 6 recites further features and combinations of features that are patentably distinct and not taught or suggested by Fujii, Papst and Dunfield either individually or combined.

The references particularly do not teach or suggest an axial thickness of at least a portion of the base plate in the range of 0.1 mm. to 0.3 mm.

5. Appellants Claim 7

It is submitted that dependent claim 7 is allowable for at least the reasons stated with regard to its independent claim 1. Further, dependent claim 7 recites further features and combinations of features that are patentably distinct and not taught or suggested by Fujii, Papst and Dunfield either individually or combined.

The references particularly do not teach or suggest “a portion of **the base plate adjacent to the separation defines an opening** that is substantially filled with the bonding substance, and the bonding substance forms a contiguous base plate.” The Examiner provides no further obviousness argument other than those provided for claim 1.

6. Appellants Claim 8

It is submitted that dependent claim 8 is allowable for at least the reasons stated with regard to its independent claim 1. Further, dependent claim 8 recites further features and combinations of features that are patentably distinct and not taught or suggested by Fujii, Papst and Dunfield either individually or combined.

The references particularly do not teach or suggest a portion of the stator positioned below an adjacent surface of the base plate, wherein the base plate has a varied axial thickness.

7. Appellants Claim 9

The cited references Dunfield, Fujii and Papst either individually or combined do not teach or suggest Appellants claim 9.

Appellants arguments that apply to claim 1 also apply to claim 9.

Claim 9 further includes incorporation into a disc drive storage system, and a data storage disc attached to a rotatable component. The references particularly do not teach or suggest “a bonding substance, formed substantially about the stator, substantially filling the separation and uniting the base plate, a motor seal and the stator, wherein the base plate axial thickness is minimized adjacent to the separation.”

8. Appellants Claim 11

It is submitted that dependent claim 11 is allowable for at least the reasons stated with regard to its independent claim 9. Further, dependent claim 11 recites further features and combinations of features that are patentably distinct and not taught or suggested by Fujii, Papst and Dunfield either individually or combined.

The references particularly do not teach or suggest a bonding substance comprising a thermally conductive epoxy having a high bonding strength. Regarding claim 11, the Examiner states that the references do not disclose the claimed invention but it is obvious to one having ordinary skill in the art... The Examiner provides no concrete evidence or evidentiary support for this finding.

9. Appellants Claim 12

It is submitted that dependent claim 12 is allowable for at least the reasons stated with regard to its independent claim 9. Further, dependent claim 12 recites further features and combinations of

features that are patentably distinct and not taught or suggested by Fujii, Papst and Dunfield either individually or combined.

The references particularly do not teach or suggest a thermally conductive epoxy comprising one of TC-2707 and DP-190. Regarding claim 12, the Examiner states that the references do not disclose the claimed invention but it is obvious to one having ordinary skill in the art... The Examiner provides no concrete evidence or evidentiary support for this finding.

10. Appellants Claim 14

It is submitted that dependent claim 14 is allowable for at least the reasons stated with regard to its independent claim 9. Further, dependent claim 14 recites further features and combinations of features that are patentably distinct and not taught or suggested by Fujii, Papst and Dunfield either individually or combined.

The references particularly do not teach or suggest an axial thickness of at least a portion of the base plate in the range of 0.1 mm. to 0.3 mm.

11. Appellants Claim 15

It is submitted that dependent claim 15 is allowable for at least the reasons stated with regard to its independent claim 9. Further, dependent claim 15 recites further features and combinations of features that are patentably distinct and not taught or suggested by Fujii, Papst and Dunfield either individually or combined.

The references particularly do not teach or suggest “a portion of **the base plate adjacent to the separation defines an opening** that is substantially filled with the bonding substance, and the bonding substance forms a contiguous base plate.” The Examiner provides no further obviousness argument other than those provided for claim 9.

12. Appellants Claim 16

It is submitted that dependent claim 16 is allowable for at least the reasons stated with regard to its independent claim 9. Further, dependent claim 16 recites further features and combinations of

features that are patentably distinct and not taught or suggested by Fujii, Papst and Dunfield either individually or combined.

The references particularly do not teach or suggest a portion of the stator positioned below an adjacent surface of the base plate, wherein the base plate has a varied axial thickness.

13. Appellants Claim 17

The cited references Dunfield, Fujii and Papst either individually or combined do not teach or suggest Appellants method claim 17.

Appellants arguments that apply to claim 1 also apply to claim 17.

The references particularly do not teach or suggest “forming a bonding substance substantially about the stator; filling substantially with the bonding substance a separation defined between the stator and the base plate; uniting the base plate, a motor seal and the stator; and minimizing the base plate axial thickness adjacent to the separation.”

14. Appellants Claim 19

It is submitted that dependent claim 19 is allowable for at least the reasons stated with regard to its independent claim 17. Further, dependent claim 19 recites further features and combinations of features that are patentably distinct and not taught or suggested by Fujii, Papst and Dunfield either individually or combined.

The references particularly do not teach or suggest utilizing a thermally conductive epoxy having a high bonding strength for a bonding substance. Regarding claim 19, the Examiner states that the references do not disclose the claimed invention but it is obvious to one having ordinary skill in the art... The Examiner provides no concrete evidence or evidentiary support for this finding.

15. Appellants Claim 20

It is submitted that dependent claim 20 is allowable for at least the reasons stated with regard to its independent claim 17. Further, dependent claim 20 recites further features and combinations of features that are patentably distinct and not taught or suggested by Fujii, Papst and Dunfield either individually or combined.

The references particularly do not teach or suggest positioning a portion of the stator below an adjacent surface of the base plate, wherein the base plate has a varied axial thickness.

16. Appellants Claim 21

It is submitted that dependent claim 21 is allowable for at least the reasons stated with regard to its independent claim 17. Further, dependent claim 21 recites further features and combinations of features that are patentably distinct and not taught or suggested by Fujii, Papst and Dunfield either individually or combined.

The references particularly do not teach or suggest at least a portion of the base plate formed having an axial thickness in the range of 0.1 mm. to 0.3 mm.

17. Appellants Claim 22

It is submitted that dependent claim 22 is allowable for at least the reasons stated with regard to its independent claim 17. Further, dependent claim 22 recites further features and combinations of features that are patentably distinct and not taught or suggested by Fujii, Papst and Dunfield either individually or combined.


The references particularly do not teach or suggest “**forming an opening through the portion of the base plate** adjacent to the separation, substantially filling the opening with the bonding substance, and forming a contiguous base plate with the bonding substance.” The Examiner provides no further obviousness argument other than those provided for claim 17.

CONCLUSION

It is submitted that Appellants claims 1, 3-4, 6-9, 11, 12, 14-17 and 19-22 are not obvious within the meaning of 35 U.S.C. § 103(a) and patentably define the subject invention over the cited references of record. Accordingly, Appellants respectfully request that the Board reverse the decision of the Examiner and pass the present application to Issue.

Respectfully submitted,
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Dated: March 17, 2006

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3-17-2006
March 17, 2006

CLAIMS APPENDIX

The claims involved in this Appeal are as follows:

1. A spindle motor comprising:
 - a rotatable component defining a bearing gap and relatively rotatable with a stationary component;
 - a base plate affixed to the stationary component;
 - a stator, affixed to the stationary component, for generating an electromagnetic force that interacts with the rotatable component and drives the rotatable component, wherein the stator and the base plate define a separation there between; and
 - a bonding substance, formed substantially about the stator, substantially filling the separation and uniting the base plate, a motor seal and the stator, wherein the base plate axial thickness is minimized adjacent to the separation.
3. The spindle motor as in claim 1, wherein the bonding substance comprises a thermally conductive epoxy having a high bonding strength.
4. The spindle motor as in claim 3, wherein the thermally conductive epoxy comprises one of TC-2707 and DP-190.
6. The spindle motor as in claim 1, wherein the axial thickness of at least a portion of the base plate is in the range of 0.1 mm. to 0.3 mm.
7. The spindle motor as in claim 1, wherein a portion of the base plate adjacent to the separation defines an opening that is substantially filled with the bonding substance, and the bonding substance forms a contiguous base plate.
8. The spindle motor as in claim 1, wherein a portion of the stator is positioned below an adjacent surface of the base plate, wherein the base plate has a varied axial thickness.

9. A spindle motor for incorporation into a disc drive storage system comprising:
- a rotatable component defining a bearing gap and relatively rotatable with a stationary component;
 - a base plate affixed to the stationary component;
 - a data storage disc attached to the rotatable component;
 - a stator, affixed to the stationary component, for generating an electromagnetic force that interacts with the rotatable component and drives the rotatable component, wherein the stator and the base plate define a separation there between; and
 - a bonding substance, formed substantially about the stator, substantially filling the separation and uniting the base plate, a motor seal and the stator, wherein the base plate axial thickness is minimized adjacent to the separation.
11. The spindle motor as in claim 9, wherein the bonding substance comprises a thermally conductive epoxy having a high bonding strength.
12. The spindle motor as in claim 11, wherein the thermally conductive epoxy comprises one of TC-2707 and DP-190.
14. The spindle motor as in claim 9, wherein the axial thickness of at least a portion of the base plate is in the range of 0.1 mm. to 0.3 mm.
15. The spindle motor as in claim 9, wherein a portion of the base plate adjacent to the separation defines an opening that is substantially filled with the bonding substance, and the bonding substance forms a contiguous base plate.
16. The spindle motor as in claim 9, wherein a portion of the stator is positioned below an adjacent surface of the base plate, wherein the base plate has a varied axial thickness.
17. A method comprising:

defining a bearing gap between a rotatable component and a stationary component;
affixing a base plate to the stationary component;
affixing a stator to the stationary component, for generating an electromagnetic force that interacts with the rotatable component and drives the rotatable component;
forming a bonding substance substantially about the stator;
filling substantially with the bonding substance a separation defined between the stator and the base plate;
uniting the base plate, a motor seal and the stator; and
minimizing the base plate axial thickness adjacent to the separation.

19. The method as in claim 17, further comprising utilizing a thermally conductive epoxy having a high bonding strength for the bonding substance.

20. The method as in claim 17, further comprising positioning a portion of the stator below an adjacent surface of the base plate, wherein the base plate has a varied axial thickness.

21. The method as in claim 17, wherein at least a portion of the base plate is formed having an axial thickness in the range of 0.1 mm. to 0.3 mm.

22. The method as in claim 17, further comprising forming an opening through the portion of the base plate adjacent to the separation, substantially filling the opening with the bonding substance, and forming a contiguous base plate with the bonding substance.